REMARKS

Applicant has extensively amended the claims to reduce the issues and more specifically distinguish over the prior art.

With respect to Claim 5: Figures 3 and 4 of the present invention illustrate charge carrier flow (30) moving (and thereby carrying heat) from the hotter center region (20) on the substrate (14) outward toward the perimeter of the substrate (14). An electrical source is connected the heat absorbing junction (46) (in the substrate center) and heat rejecting junction (48) (by way of conductive vias (38, 40)), both junctions connected to the conductive member (32). Figures 1 and 2 of Burward-Hoy (and Mansuria et al. col. 1:7-40) do not illustrate charge carrier flow between the substrate (235) and the thermoelectric cooling device (201) or even electrical continuity between the two constructs. Within the thermoelectric cooling device (201), heat flows from the second plate (225) to the first plate (215) in the Z axis only. The thermoelectric cooling device (201) does not provide for electrical charge carrier flow to move from the centermost region of the substrate (235) outward toward the perimeter of the substrate in the X and Y axis, and therefore, anticipation is not found.

With respect to Claim 7: Bhatia in Figure 2 (col. 3:47-58) discloses that the IC (42) is electrically connected to the circuit board (40). On page 18, lines 20-35 of the present invention, it can be seen that both a power source (62) and an electrical load, such as an integrated circuit or other electronic circuit, are electrically in series with the structure (52) via the electrically conductive members (56, 58). This structure is reflected in Claim 7.

With respect to Claim 12: Burward-Hoy (col. 3:30) discloses "A block 230 of heat conducting material, such as copper, thermally couples the integrated circuit chip 235 to

the second plate 225 so that IC chip 235 may be cooled to sub-ambient temperatures." No reference is made to an electrical connection between the semiconductor substrate (235) and the conductive or semiconductive member (230). Within page 12, lines 23-34 of the present invention, the attachment between the semiconductor substrate (14) and conductive or semiconductive member (32) can be electrically conductive as set out in claim 12.

Claim 22 has been rewritten to include the limitations of Claim 23 to more specifically distinguish over prior art.

With respect to Claim 23: Within the present invention, the terms "heat absorbing junction" and "heat rejecting junction" refer to electrically bonded dissimilar conductors or semiconductors (forming a thermoelectric couple) which absorb heat or reject heat when the couple experiences charge carrier flow, resulting from the Peltier Effect. Figure 5 of the present invention illustrates how, in the X and Y axis, a heat absorbing junction (46) is located in the center of the substrate (10) and a heat rejecting junction (48) is located around the perimeter of the structure (50). Figure 2 of Burward-Hoy illustrates, in the X and Y axis, that the heat absorbing junctions (interfacing the second plate (225)) and heat rejecting junctions (interfacing the first plate (215)) of all the elements (220) are located across the entire X Y plane. It is urged that these differences as set forth in the claim render the claim patentable.

Regarding Claim 28, Figure 8 (page 17, lines 10-28) of the present application illustrates a heat absorbing junction (46) whose surface area and location correlate with that of the bonded IC device structure (10). However, the heat rejecting junction (48) surface area and location do not correlate with that of the bonded IC device structure (10). No portion of the heat rejecting junction (48) is within the bond line region (54) through the Z axis of the heat spreader structure (50). Figure 2 of Burward-Hoy illustrates a thermoelectric cooling device (201) whose conductive elements (220) include heat rejecting junctions interfacing the first

plate (215). Several heat rejecting junctions do correlate with that of the bonded IC device (235) through the Z axis of the thermoelectric cooling device (201) as set out in the claim.

Regarding Claim 31, Bhatia in Figure 2 (col. 3:47-58) discloses that the IC (42) is electrically connected to the circuit board (40). Within page 18, lines 20-35 of the present application, it can be seen that both a power source (62) and an electrical load, such as an integrated circuit or other electronic circuit, are electrically in series with the structure (52) via the electrically conductive members (56, 58), as set out in the claim.

With respect to Claim 34: Burward-Hoy (col. 3:30) discloses "A block 230 of heat conducting material, such as copper, thermally couples the integrated circuit chip 235 to the second plate 225 so that IC chip 235 may be cooled to sub-ambient temperatures." No reference is made to an electrical connection between the semiconductor substrate (235) and the conductive or semiconductive member (230). Within page 12, lines 23-34 of the present invention, the attachment between the semiconductor substrate (14) and conductive or semiconductive member (32) can be electrically conductive.

Claim 43 has been rewritten to include Claim 46 to more specifically distinguish over the prior art.

Regarding Claim 49, Bhatia in Figure 2 (col. 3:47-58) discloses that the IC (42) is electrically connected to the circuit board (40). Within page 18, lines 20-35 of the present application, it can be seen that both a power source (62) and an electrical load, such as an integrated circuit or other electronic circuit, are electrically in series with the structure (52) via the electrically conductive members (56, 58), limitations found within the claim.

Regarding Claim 52: Figures 10a through 10c (page 19, lines 25 through 38 and page 20, lines 1 through 25) of the present application illustrate a multistage heat dissipating IC device structure comprising a thermoelement couple which is neither connected to a power source or external load. Within

each single thermocouple, the two thermoelements (32, 34) are electrically bonded to each other at both the heat absorbing junctions (46) and heat rejecting junctions (48), thereby creating a closed circuit thermoelement couple structure (64). Figure 2a of Buist (col. 3:30-35) discloses a power source (34) connected to the thermocouple via a P-type element contact (38) and a N-type element contact (42). Furthermore, Buist does not disclose the creation of a closed circuit thermoelement couple structure, which requires an electrical bond between both elements (30, 32) at the heat rejecting junctions and heat absorbing junctions, all within each single thermoelement couple.

The applicant believes Claims 6, 10, 11, 24, 26, 29, 44, 45, and 47 are now allowable resulting from corrections to the base claims.

It is believed that the present application is in condition for allowance and notice thereof is solicited.

The Commissioner is authorized to charge any additional fees of deficiencies to Deposit Account No. 07-1900.

Respectfully submitted,
JENSEN & PUNTIGAM, P.S.

By ______________________

Robert A. Jensen #24,268
Attorney for Applicant

RAJ:mw

(206) 448-3200